

Use Case 11: Short Circuit Localization

Summary:

This procedure describes what activities are performed by an operator in the control room when the protection system detects failures in the power system.

Short circuit relays indicate that a short circuit has occurred, but they do not mark the place of the short circuit in the power system. The Short Circuit Localization has to find the network part where the short circuit is located. The located network part is marked in a special color [UC21].

Actor(s):

Name	Role description
Operator in the control room	manages the field crew and starts a confirmation after resolving
Field crew	searches for the detailed location and reason (if necessary) and confirms resolving of the problem

Participating Systems:

System	Services or information provided
Network Operation	<ul style="list-style-type: none"> Network operation monitoring Fault management (Fault occurrence diagnostic and Fault localization analysis)
Operational Planning and Optimization	<ul style="list-style-type: none"> Operation work scheduling (dispatching of field crews)
Customer Interface Management and Control	<ul style="list-style-type: none"> Customer trouble information (Outage analysis and Outage reporting)

Pre-conditions:

The SCADA System is in operation. The operator is logged in the system. Short circuit localization receives correct and sufficient information for a reliable localization. The crew is ready and equipped.

Assumptions / Design Considerations:

Real time performance: The short circuit diagnosis is generated fast enough to allow the operator to take corrective action.

Normal Sequence:

Use Case Step	Description
Start short circuit localization	The breaker trip caused by the short circuit starts the function automatically.
View results	The function produces events, alarms and changes the map representation of the network [UC21].
Analyze results	Dependent on results there are different orders: 1) The function is able to locate the exact faulted element. The operator contacts a field crew to resolve the problem on the element.

	2) The function is only able to locate faulted area (group of elements). Then the operator tells the field crew to search for the problem within the area. 3)The function can not locate an element or an area, it only gives a suspicious area. The operator orders the field crew to check the suspicious area for the problem.
Fault Isolation	Use case Fault Isolation is described in [UC29].
Update customer information	The operator updates data in the Customer trouble information (e.g. affected feeder and Estimated time to restore - ETOR). [Exception - There are no customers affected by the short circuit.]
Service Restoration	Use case Service Restoration is described in [UC32].
Start short circuit localization again	After the problem has been resolved by the field crew, the operator starts a confirmation manually (using the function again)

Exceptions / Alternate Sequences:

[Exception - There are no customers affected by the short circuit.]: The step 'Update customer information' is dropped.

Post-conditions:

It should be possible in some cases for the operator to locate the element of the short circuit or one group of elements (within which one is the fault element). If the operator can not pinpoint the location, he got a series of possible (suspicious) elements. Elements can be bus-bars, switches, transformers or lines.

References:

- [1] Use Case – UC21 Network Coloring
- [2] Use Case – UC29 Fault Isolation)
- [3] Use Case – UC32 Service Restoration